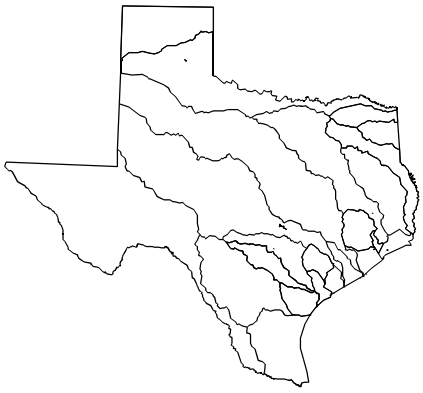
Chapter 4
Completing the Framework for a Watershed Management Approach



The objective of the watershed management approach is to ensure that the OWRM programs, Field Operations Division, and other stakeholders collaborate, so that individual management efforts collectively result in cost-effective protection or restoration of water quality. The targeting, strategy development, and implementation activities of Phases 3 through 5 complete the cycle of activities to achieve this objective. Chapter 4 describes the activities necessary to develop and implement watershed action plans for priority watersheds and the support structure to facilitate these activities. Existing building blocks presented in Chapter 3 provide substantial support for primary activities in Phases 1 through 3 of the basin management cycle, including scoping, data collection, and assessment. These three phases will also result in the establishment of a consistent process to collect data which will support TMDL development for selected water bodies. Historically, these activities have been managed through individual, and relatively separate, programs. Under the watershed management approach, however, these activities will be linked through strategic planning to provide scientifically valid information and stakeholder input to water resource managers. Chapter 4 describes how the OWRM will adapt its operations under a watershed management cycle, with emphasis placed on key activities and functional relationships. Roles and responsibilities for carrying out these functions and activities are covered in Chapter 5. Currently, the TNRCC does not possess all of the staff resources necessary to achieve optimum implementation of the roles and responsibilities outlined in Chapters 4 through 6. The agency will implement the approach using existing staff resources and will look to adjust these resources over time to more effectively support the watershed management process.

Developing and Implementing Strategies for Priority Watersheds

Through activities occurring in Phases 1 through 3 of the basin management cycle, the OWRM works with other stakeholders in each basin (according to the statewide schedule) to clarify the sources and extent of impacts in those watersheds designated as priorities in Phase 1. Additional information is needed, however, to guide local, regional, and state resource managers in the strategy development phase. The process of moving from technical assessment of watershed conditions to the selection of specific issues within priority watersheds to be addressed through TMDLs (or watershed action plans) is referred to as targeting.

Targeting

The objective of the targeting activities in Phase 3 is to assist the OWRM and other stakeholders in determining what specific management efforts should be developed and included in the TMDL to address the known sources of impairment in priority watersheds. The TNRCC recognizes the fact that priority watersheds identified in Phase 1 often display multiple causes of impairment. A water body might be affected by one or several stressors that contribute to the nonattainment of each applicable water quality standard. A TMDL typically addresses a single pollutant or stressor. Thus, it is sometimes necessary to determine whether a single TMDL or several TMDLs are needed to address the problems of a body of water. However, a TMDL for multiple stressors may be developed if it is efficient to do so and the resulting TMDL will be scientifically sound in the judgment of the regulatory agency. The TNRCC also recognizes that agency time, resources, and funds available to address priority watersheds are limited and may be insufficient to deal with each source of impairment simultaneously. As a result, managers may be faced with choosing between actions within and among priority watersheds. Under the watershed management approach, OWRM managers will begin to make targeting decisions using the following series of assessment and planning steps.

1. *Determine the scale of the problem:* Identify the geographic level at which the priority issue is best addressed: site, water body/aquifer, watershed, or basin.

2. *Quantify the magnitude and severity of the problem and risk*: Identify the extent of ecological degradation (existing or potential) and the risks posed by the problem and its causes. For example, is human life or health threatened? Is there potential for irreversible damage to valuable resources? Will management costs increase significantly in the future if the problem is not handled immediately? Will the focus of management be restoration or protection?

3. *Rank priority problems:* Based on the findings of Steps 1 and 2, determine which problems pose the most serious risk and require immediate attention.

4. *Establish required degree of action:* Use models, comparative risk techniques, and professional judgment as appropriate to determine the degree of pollution reduction or physical restoration required to meet standards and objectives. For example, a lake water quality model might be used to project that a 40 percent reduction in phosphorus loading would restore the lake to an acceptable trophic status and reduce occurrences of nuisance algal blooms.

5. *Identify key stakeholders to address problem(s):* Identify public and private agencies, organizations, and individuals that have a significant role in solving the problem(s) to the degree required to achieve standards and objectives. This includes those with regulatory authorities (e.g., rule making, permitting, and enforcement) and nonregulatory capabilities (e.g., landowner best management practices, technical assistance, education, and outreach).

6. *Inventory stakeholder resources available for problem solving:* Survey expertise, funds, equipment, personnel, volunteers, and other available resources for developing and implementing management strategies in each priority watershed. Maintaining a suite of TNRCC water resource management tools from which to draw will expedite the allocation of available program resources. Table 4-1 provides a partial list of existing TNRCC management tools that support watershed management.

7. *Determine feasibility and estimate effectiveness:* Analyze a range of management options that key stakeholders might apply to address the problem(s), and determine their feasibility (technical, political, and financial) and effectiveness (singly or in combination) in achieving significant progress toward the desired standards and objectives.

At this point, stakeholders decide which priority watersheds are most in need of integrated management efforts. Through the analysis steps described above, basin stakeholders know which problems pose the greatest risks, where groups are willing and able to work together to solve the problems, and whether the problems appear to have feasible solutions. Basin representatives use this information to finalize the specific sources of impairment within priority watersheds which will be addressed in watershed action plans.

TMDL (Watershed Action Plan) Development

Key stakeholders within priority watersheds work together throughout Phases 3, 4, and 5 to develop and implement feasible, cost-effective action plans. The OWRM cannot conduct these activities by itself, because many solutions will require actions and authority that fall outside of the OWRM's jurisdiction. With its mission to ensure the protection and restoration of water resources, the OWRM has a vested interest in working with others to develop and implement TMDLs. Watershed management will be used to ensure that OWRM program implementation actions (e.g., permitting, point and nonpoint source project grants, enforcement, and outreach) are efficient and effective in addressing basin priorities and achieving water quality standards and management objectives.

The following steps are recommended to carry out the development of TMDLs or watershed action plans.

1. *Clarify watershed-specific management goals and objectives:* Local, regional, state, and federal stakeholders gather in the priority watershed to clarify watershed-specific management goals and objectives. Where appropriate, specific emphasis will be placed on establishing point and nonpoint source reduction goals for TMDLs in priority watersheds.

2. *Identify most promising management alternatives:* Based on the analysis performed during the targeting phase, watershed stakeholders choose promising management options or scenarios (i.e., combinations of management options) to achieve pollution reduction goals.

3. *Evaluate alternatives:* Stakeholders utilize technical expertise provided by local, regional, state, and federal entities and private consultants to identify indicators that link management alternatives to management objectives. Indicators are specific parameters associated with water resources that are meaningful to decision makers, are measurable, or can be ranked subjectively, and can be predicted in response to management options. Future conditions in the watershed are then evaluated under different management alternatives. Results for key indicators are compared across scenarios to determine which alternative or combination of alternatives best meet the management goals and objectives.

4. *Select optimal management strategies and draft action plan*. Stakeholders consider results from the evaluation of alternatives and other key decision criteria (e.g., degree of certainty in achieving results, potential for unintended consequences, and ability to retrofit solutions when unexpected conditions occur), and then select the optimal management strategies. An action plan is prepared to describe the methods, stakeholder roles and responsibilities, funding, and timetables for strategy implementation.

5. *Finalize and implement action plan*. Draft TMDLs or watershed action plans will be circulated among the watershed community and stakeholders to raise awareness and fine-tune recommendations. After finalization, implementation of plan provisions begins.

Table 4-1. Partial List of Existing TNRCC Tools for Water Quality Management

Description of Watershed Management Tools	Managing Team
Strategic Monitoring	
Ambient and targeted water quality sampling	Clean Rivers Program Team, Surface Water Quality Monitoring Team, Texas Watch Volunteer Monitoring Team, Nonpoint Source Program Team, Field Operations Division
Performance monitoring of best management practices and effectiveness of watershed action plans	Clean Rivers Program Team, Surface Water Quality Monitoring Team, Texas Watch Volunteer Monitoring Team, Nonpoint Source Program Team, Field Operations Division
Planning	
Water quality/watershed modeling	Water Quality Modeling Team
Water quality management planning	Watershed Management Team
Nonpoint source management planning	Nonpoint Source Program Team
Estuary water quality management planning	Galveston Bay Estuary Program, Corpus Christi Bay National Estuary Program

Description of Watershed Management Tools	Managing Team
Technical Assistance	
Wellhead protection plans	Source Water Protection Program Team, Surface Water Uses Team
Water conservation plans	Water Rights Conservation Team
Operation and maintenance plans for wastewater plants	Industrial Permits Team, Municipal Permits Team, Plan Review Team
QA/QC guidance	Clean Rivers Program Team, Surface Water Quality Monitoring Team
Water quality monitoring guidance	Clean Rivers Program Team, Surface Water Quality Monitoring Team
Volunteer monitoring training	Texas Watch Volunteer Monitoring Team
Pretreatment program audits	Pretreatment Team
Review wastewater plant specifications and wastewater reuse plans	Pretreatment Team, Industrial Permits Team, Municipal Permits Team
Use attainability analysis for stream classification	Water Quality Standards Team
Best management practices for nonpoint source pollution management	NPS Program Team
Voluntary cleanup of contaminated/polluted facilities	Voluntary Cleanup Section
Educational/Outreach	
Texas Watch annual meeting for volunteer monitors	Texas Watch Volunteer Monitoring Team
Texas Watch regional meetings	Texas Watch Volunteer Monitoring Team
Rio Grande Basin computer bulletin board system and Internet home page	Border Environmental Assessment Team
OWRM Internet home page	Office of Water Resource Management
Nonpoint source pollution informational materials	Nonpoint Source Program Team, Groundwater Nonpoint Source Team, OPPR
Basin steering committee meetings	Clean Rivers Program Team, Border Environmental Assessment Team
TNRCC Water/Wastewater annual seminars	Various TNRCC programs
Environmental education (grades K–12)	Office of Pollution Prevention and Recycling
CLEAN TEXAS 2000 program	Office of Pollution Prevention and Recycling
Environmental Information Line	Agency Communications Division
Storm drain stenciling program	Office of Pollution Prevention and Recycling
Funding	
CWA §319 grants	Nonpoint Source Program Team
CWA §604(b) grants	Clean Rivers Program Team, Modeling Team
CWA §104(b)(3) grants	Office of Water Resource Management

Description of Watershed Management Tools	Managing Team
Supplemental environmental project funds	Office of Pollution Prevention and Recycling
Nonregulatory Mechanisms	
Voluntary watershed management implementation	Source Water Protection Team, Nonpoint Source Program Team, Groundwater Nonpoint Source Team
Household hazardous waste and agricultural waste collection	Office of Pollution Prevention and Recycling
River and lake cleanup events	Office of Pollution Prevention and Recycling
Regulatory Mechanisms	
Wastewater permits, including agriculture facility and storm water permits as required	Industrial Permits Team, Municipal Permits Team, Plan Review Team, Applications Team, Agricultural Permits Team
Water quality standards	Modeling Team, Water Quality Standards Team
§404 certification of §401 dredge and fill permits	Surface Water Quality Standards Team
On-site sewage facility (OSSF) permits	Office of Compliance and Enforcement, Compliance Support Division
Occupational certification (licensing and training)	Office of Compliance and Enforcement, Compliance Support Division
Outstanding Natural Resource Waters designation	Water Quality Standards Team
Regulatory Mechanisms (TAC 213 and 216, Edwards Aquifer and Water Quality Protection Zones)	Austin and San Antonio regional offices
Enforcement actions	Office of Compliance and Enforcement, Field Operations Division
Emergency spill response	Office of Waste Management, Pollution Cleanup Division
Stream classification	Water Quality Standards Team, Water Quality Modeling Team

Support Structure for Watershed Management

Implementing a watershed management approach will require the OWRM to link existing program activities through a strategic watershed planning process. Adapting to this new paradigm will be facilitated by establishing key support structures that make coordinated planning easier and more efficient. Functional areas that benefit from these support structures include stakeholder coordination, technical planning, information management, communications and outreach, and financing.

Three forums for involving and coordinating stakeholders were described in Chapter 2: basin coordinators, basin steering committees, and priority watershed subcommittees. The support functions of these three entities in relationship to OWRM programs and CRP contractors are described below in more detail and depicted in Figure 4-1.

Basin Coordinator Support Functions

The OWRM proposes the use of basin coordinator positions to support the necessary coordination among OWRM programs and stakeholders at the basin level for the entire state. The agency recognizes that successful management of 15 major river basins, eight coastal basins, nine estuarine systems, and the extraterritorial waters of the Gulf of Mexico

using a watershed management approach will require substantial coordination among organizations statewide. Each coordinator will be assigned several basins, for which they will provide the following types of support:

- *Communication:* Coordinators are the principal point of contact between OWRM programs and other agencies, elected officials, and the public regarding framework components, management cycle activity schedules, and progress reports. Coordinators support outreach activities to build new partnerships and strengthen commitment for the watershed management approach.

- *Facilitation:* Coordinators facilitate internal dialogue and planning functions for the OWRM as needed to troubleshoot problem areas or maintain milestone schedules. Additionally, coordinators will work with partners outside of the OWRM such as CRP contractors, basin steering committee members, and local priority watershed subcommittee members to facilitate interaction and exchange of information.

- *Documentation:* A single watershed action plan may be prepared by several different groups, including individual OWRM programs and priority watershed subcommittees. Coordinators will serve as a clearinghouse, compiling sections and overseeing editing of the final plans.

- *Quality Control:* Partnerships, available resources, and the content of activities will vary from basin to basin. Coordinators will compare implementation of the framework among basins across the state and will provide a quality control function, working to ensure consistent implementation of framework components.

- *Framework Maintenance:* Given the dynamic nature of watershed management, the framework will need to be periodically refined and updated to adapt to changing needs. Coordinators, as primary points of contact, are in a good position to compile ideas for refining the framework and convey them to OWRM management for adoption and implementation by participating programs.

Basin Steering Committee Support Functions

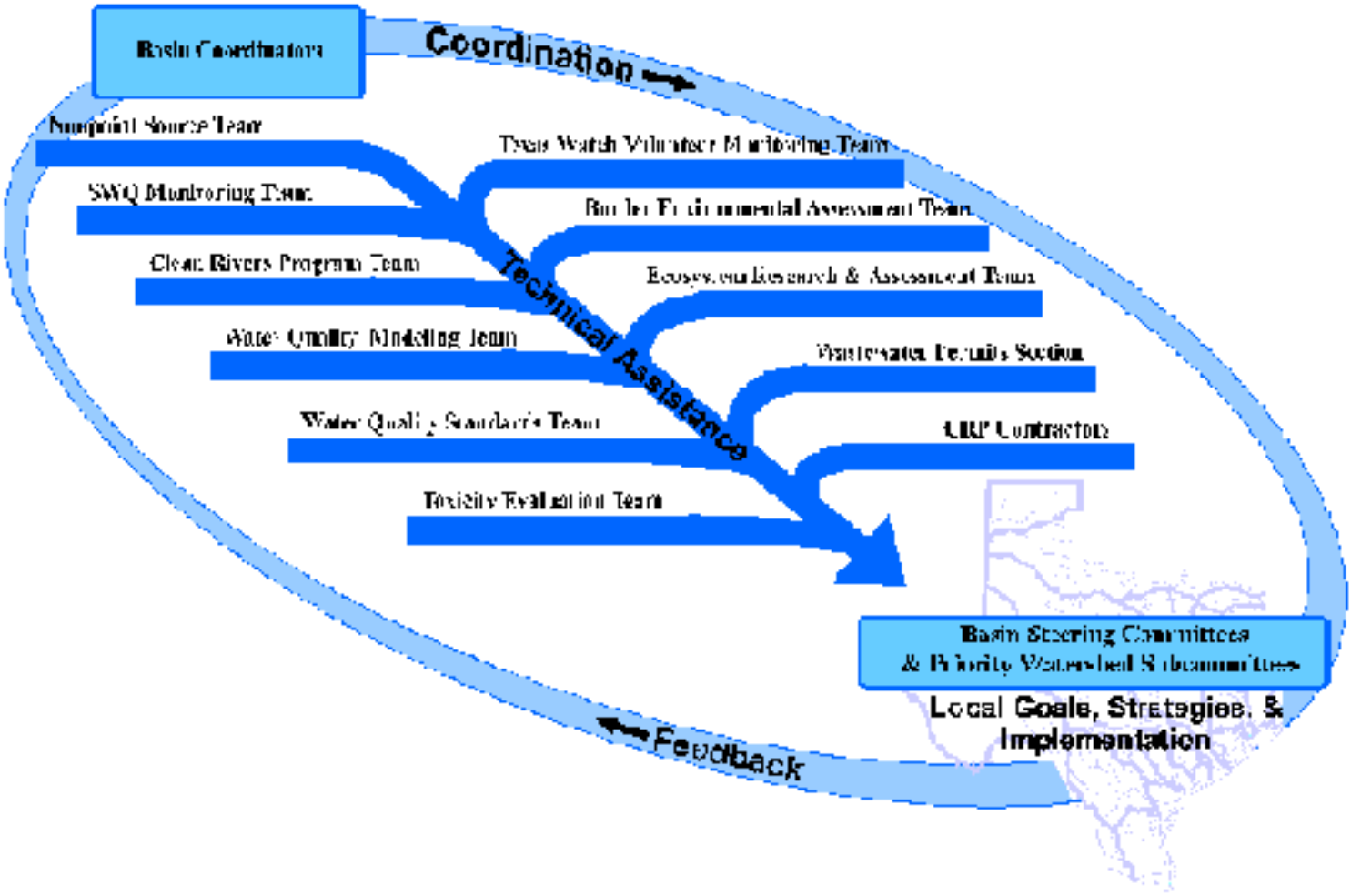
Currently, basin steering committees established through the Clean Rivers Program provide direction, recommendations, and goals relevant to the basinwide perspective. Under the watershed management framework, the basin steering committee concept will be continued and expanded. Basin steering committees should include a broad, balanced spectrum of stakeholders so that decisions on priorities for targeting watershed management efforts within a basin and communication of basin management needs are truly representative. Primary functions of the committees will include:

- *Communication:* Basin steering committees provide a consistent forum for communicating watershed management goals, priorities, management strategies, and implementation activities among local, regional, state, and federal stakeholders. Committees meet at strategic times during the management cycle to ensure that key information and issues are shared and discussed.

- *Advisory (basin-specific):* At the beginning of the management cycle, the basin steering committees will provide the forum for dialogue regarding OWRM agency priorities related to watershed management activities in their basins. Discussions will include input on §303(d) listed waters (i.e., impaired or threatened waters designated for development of total maximum daily loads) and identifying other basin priorities, nonpoint source program updates, and strategic data collection and monitoring needs to fill information gaps and support action plan development for priority watersheds. Later in the cycle, committees may be called upon to recommend how to target available stakeholder resources for the basin in light of competing needs among the priority watersheds.

- *Recruitment of Local Participants:* The steering committees will function as recruiters, actively encouraging participation of key local stakeholders in priority watershed subcommittees that will assist the development of watershed action plans. This function is based on the premise that basin steering committee members will be in a better position to identify and network with key local officials, business leaders, landowners, citizen groups, and others to be included in the process.

Figure 4-1. Functional Relationships to Support a Statewide Basin Approach



- *Basin Document Review:* Additionally, basin steering committees will review key basin reports and outreach documents (e.g., basin summary reports and financial summary reports) to ensure that contents accurately communicate steering committee involvement and how efforts are related to basin priorities.

Priority Watershed Subcommittee Support Functions

Priority watershed subcommittees represent a new forum to both increase public involvement in implementing management solutions and provide the OWRM with more local stakeholder input on developing management priorities and activities. Local stakeholders need an easily accessible venue for providing input on management goals and objectives for their watershed, and they are usually in the best position to know what is feasible regarding management actions that can be implemented at the grassroots level. Priority watershed subcommittees would be set up, therefore, to support the following key functions for the framework:

- *Advisory (watershed-specific):* After priority watershed subcommittees are formed by the basin steering committees, the subcommittees will become the primary forum for obtaining input to establish and implement watershed action plans. Initial activities in a given cycle will include clarifying watershed-specific management goals and objectives and identifying the most promising management options that appear to be both technically and politically feasible. Throughout the remainder of the cycle, subcommittees will act in an advisory capacity providing feedback on management option evaluations, action plan documentation, and implementation considerations.

- *Technical Planning:* Subcommittees will use technical expertise (provided by local, regional, state, and federal entities, and private consultants) to evaluate proposed management options to ensure that they meet the objectives established for water quality within the watershed. Based on the results of these evaluations, the subcommittees will then select optimal management strategies. Additionally, the subcommittee forum will be used to identify and document key components of the action plan, including implementation means and funding, roles and responsibilities of key stakeholders, and implementation milestones and schedules.

Information Exchange and Management Functions

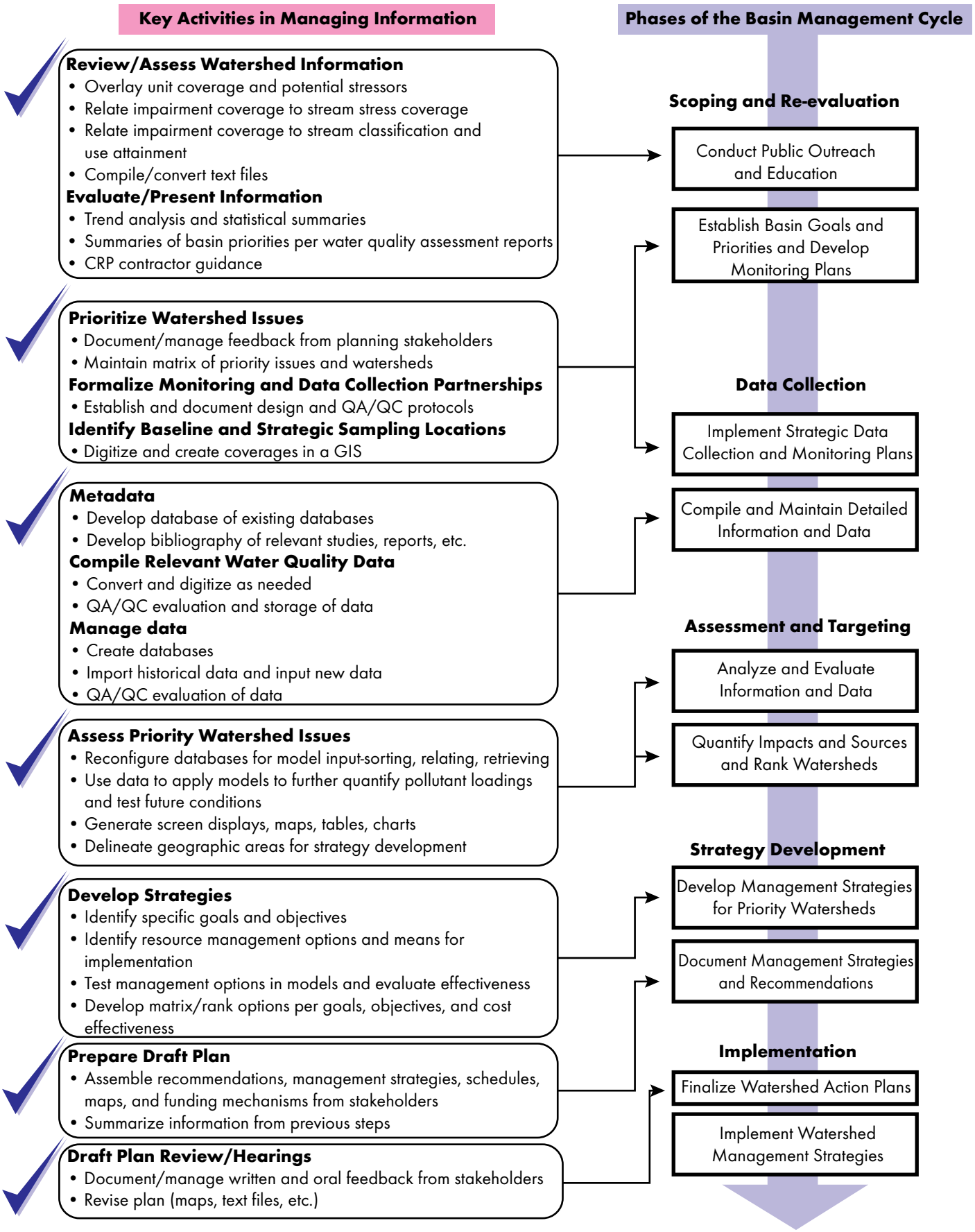
An adequate system to support information exchange and management throughout the basin management cycle is essential. Coordination and communication among OWRM programs and with other stakeholders require that information is made available, shown to be reliable, presented in useful and understandable forms, and updated as needed to track management progress. The OWRM and several other key agencies and organizations have assembled much of the hardware needed to store and retrieve large amounts of watershed-related information. The watershed management approach may, however, require refining procedures to ensure that the appropriate types of information are compiled, quality-assured, and accessible for analysis and presentation at appropriate times.

Figure 4-2 displays examples of information types and data management activities associated with the basin management cycle. Some functions to be supported under the watershed management approach include the following:

- *Presentation of Basin Information*: Early in Phase 1 of the cycle, previously compiled assessment information will need to be presented at public forums within the basin. Presentations will require the capability to compile and consolidate information from a broad range of sources. Additional support capabilities include generating presentation graphics and maps. Application of these functions will continue throughout the basin management cycle.

- *Recording Public Input*: Throughout the cycle, public input will be gathered on several key outcomes including priority watersheds, targeted management issues, candidate management options, and priority watershed action plans. Maintaining a historical record will allow future referencing of this input, and thereby provide continuity from one iteration of the basin management cycle to the next. Not having to start over from scratch with each iteration is one source of the efficiency of the basin management cycle;

Figure 4-2. How Information Management Relates to the Basin Management Cycle



however, this benefit can be achieved only if information is compiled, stored, and easily retrievable.

- *Recording Management Activity Outputs:* Key outputs from core management activities are generated throughout the cycle, and they require management for long-term reference. Early in the cycle, a matrix of priority issues and watersheds is generated and followed by development of a strategic data collection and monitoring plan to fill information gaps and to support management strategy development. In Phases 3 and 4, analysis and assessment results are generated that help target management efforts and modeling results that compare the effectiveness of alternative management strategies. Phase 4 also includes the compilation of information into priority watershed action plans. Protocols are needed to compile, store, and manage this information.

- *Managing Data:* Watershed-related data are typically generated and maintained by a broad range of programs and organizations. Knowledge of who collected the data, what the database consists of, when it was created, how often it is updated and how its quality is assured is important to support widespread use of the information. Additionally, some data will be converted and digitized for use within GIS. Therefore, protocols for managing data should be refined to ensure support for implementation of the watershed management approach.

As a part of the transition to the watershed management approach, the OWRM will need to work with its programs and other interested parties to refine information exchange and management procedures, in order to support these and other needed functions. The next steps to establishing this level of support are outlined in Chapter 6.